

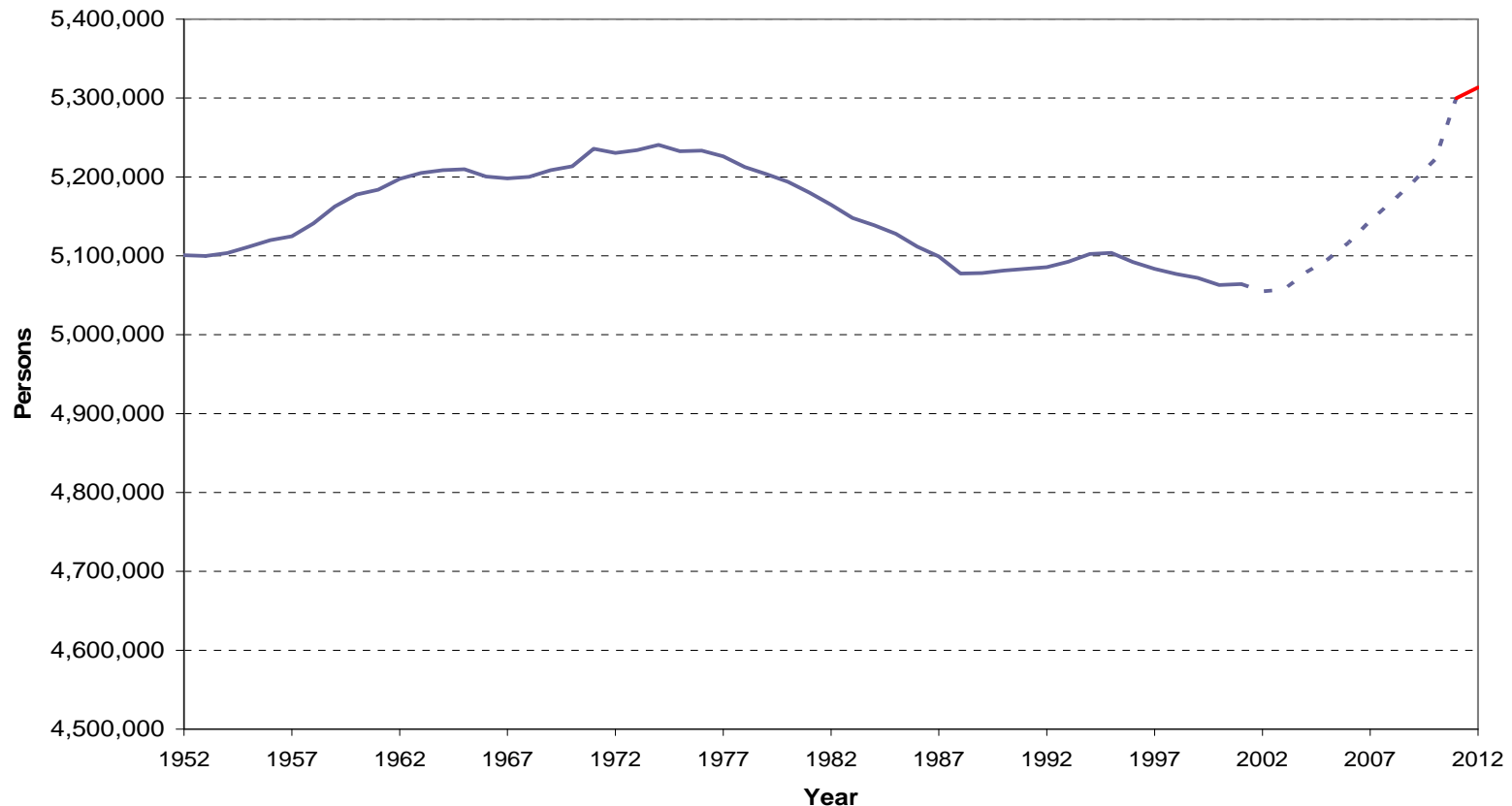
Rebasing the mid-year population estimates for Scotland

Head of Population and Migration Statistics,
National Records of Scotland

Population and Migration Statistics Conference
28 November 2013

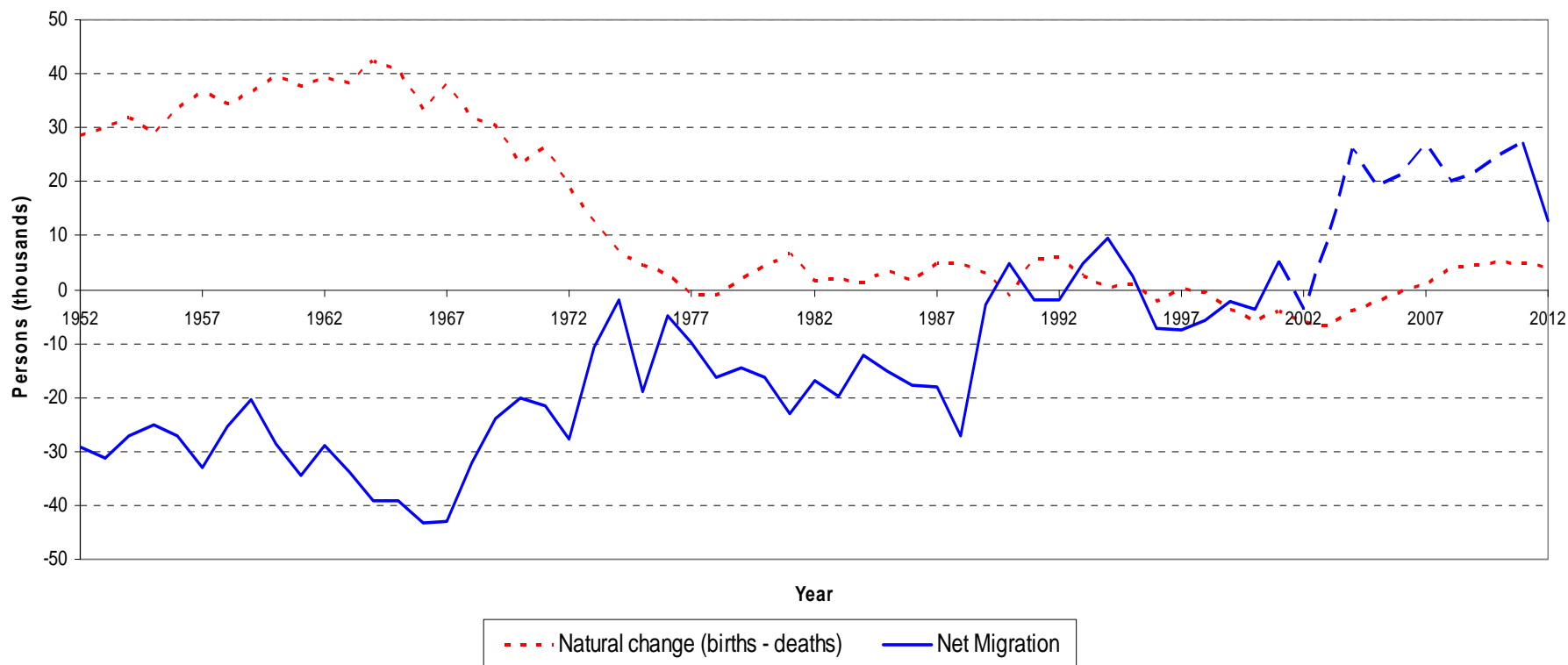
Estimated population of Scotland on 30 June 2012 was **5,313,600**

Increase of 18,200 since Census Day, highest ever recorded



Population Change 1952-2012

Natural change and net migration, 1952-2012

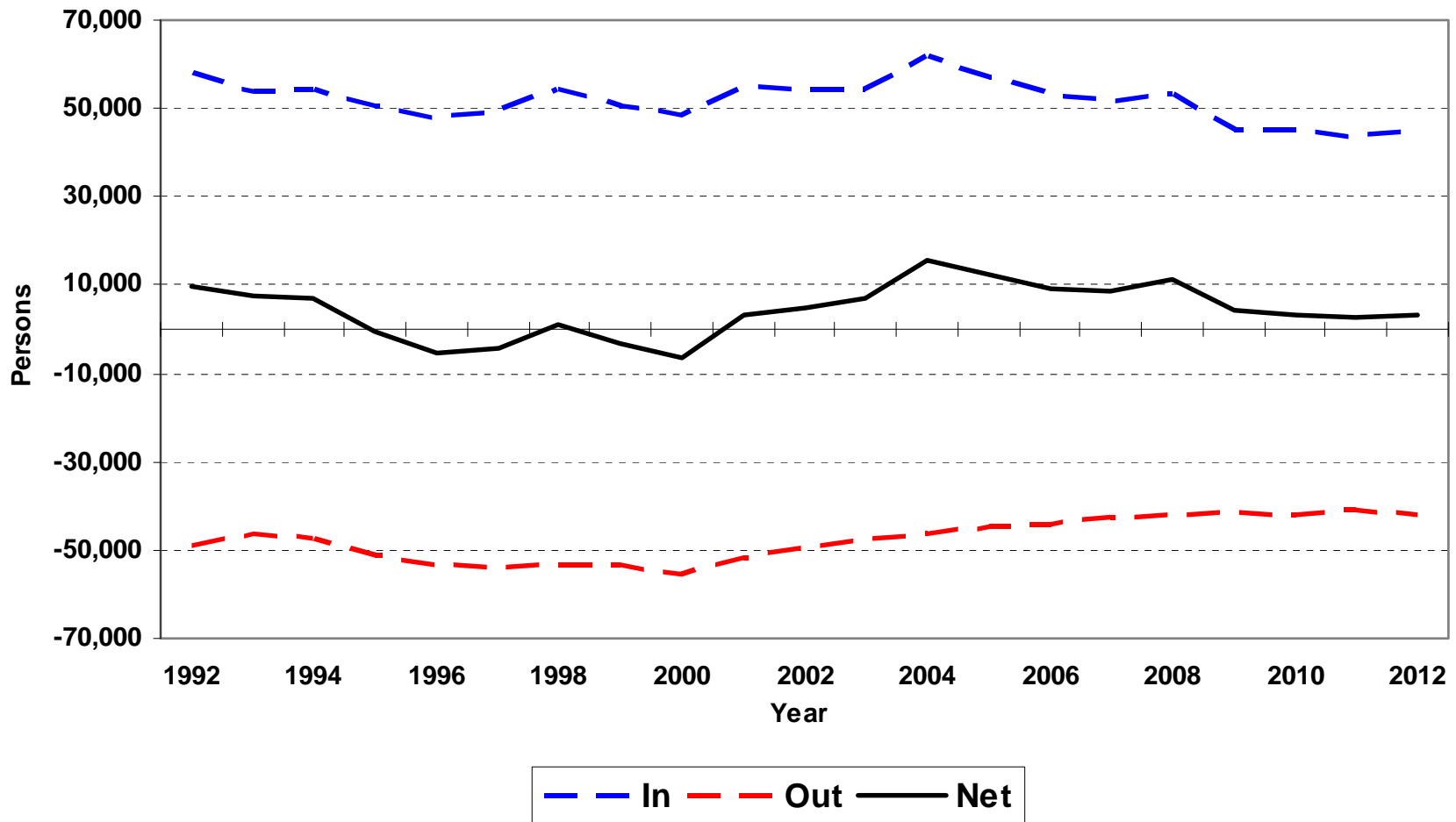


Since Census Day: Natural change: + 6,045 Net migration: + 15,186

Mid-2011 to Mid-2012: Natural change: + 4,223 Net migration: + 12,738

Rest of UK migration +3,000

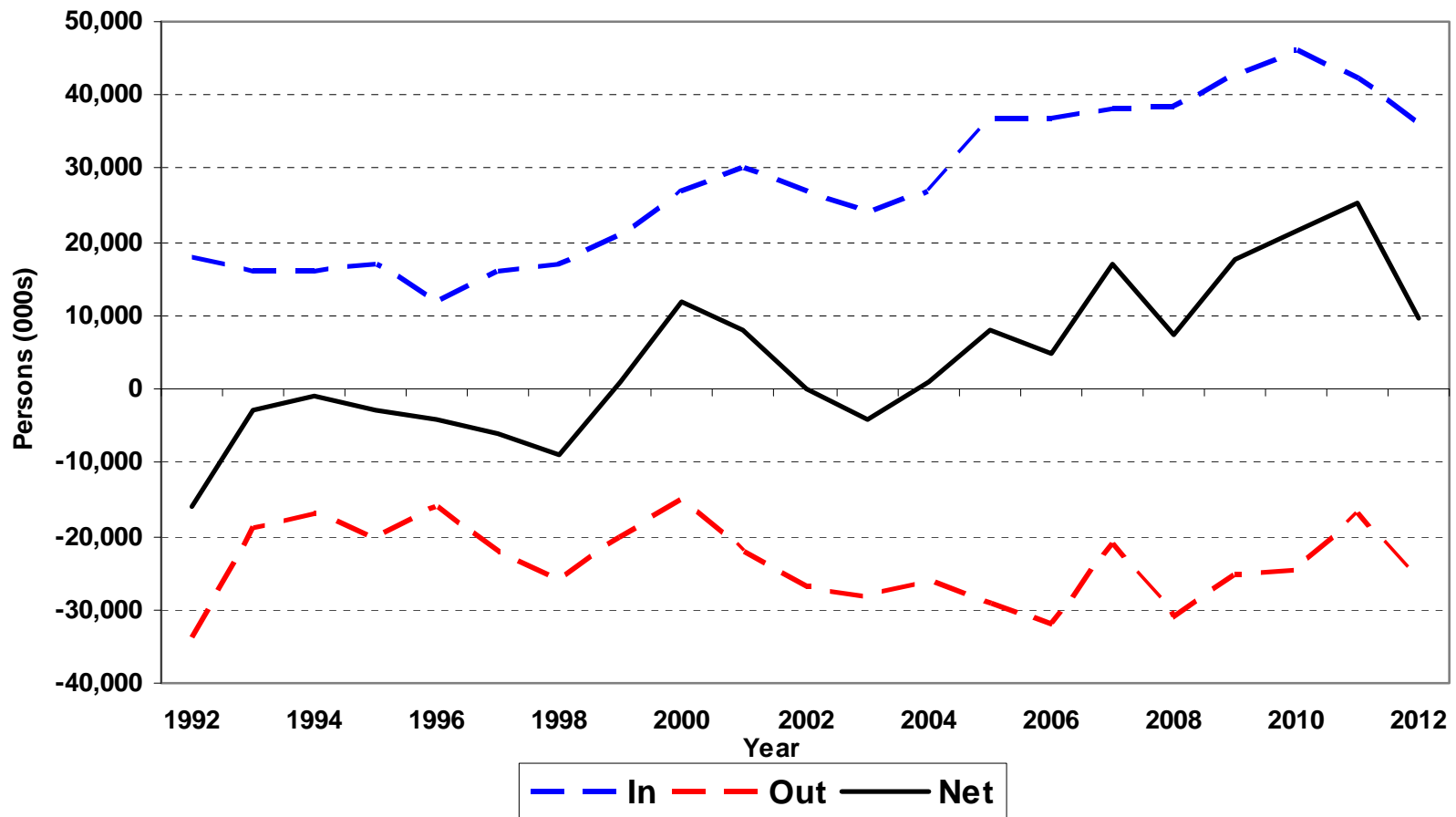
– little change, 45,100 in-migrants, 42,100 out-migrants, 3,000 net gain from rest of UK



Overseas migration + 9,700

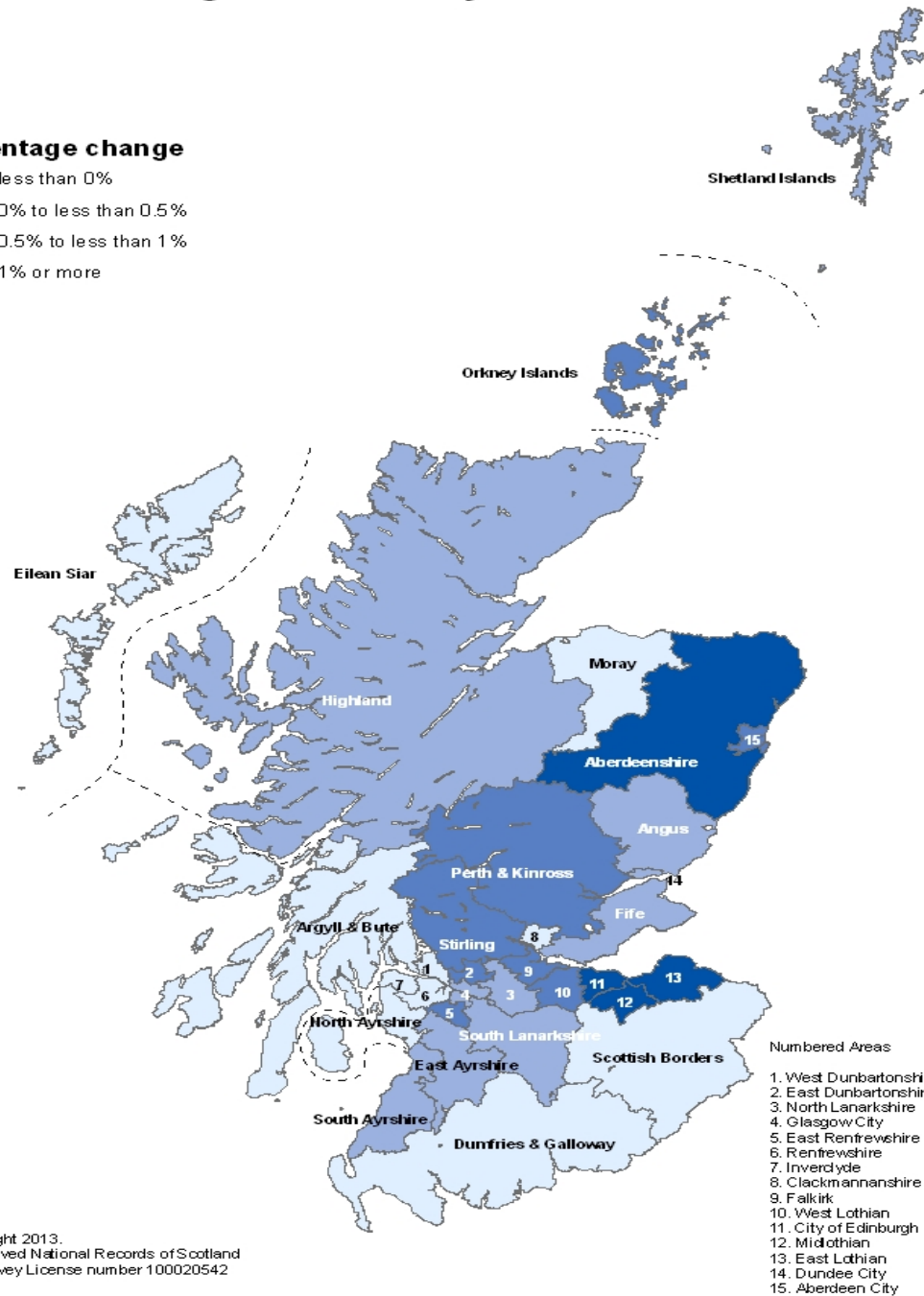
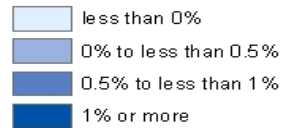
much lower than previous three years

drop in in-mig, rise in out-mig

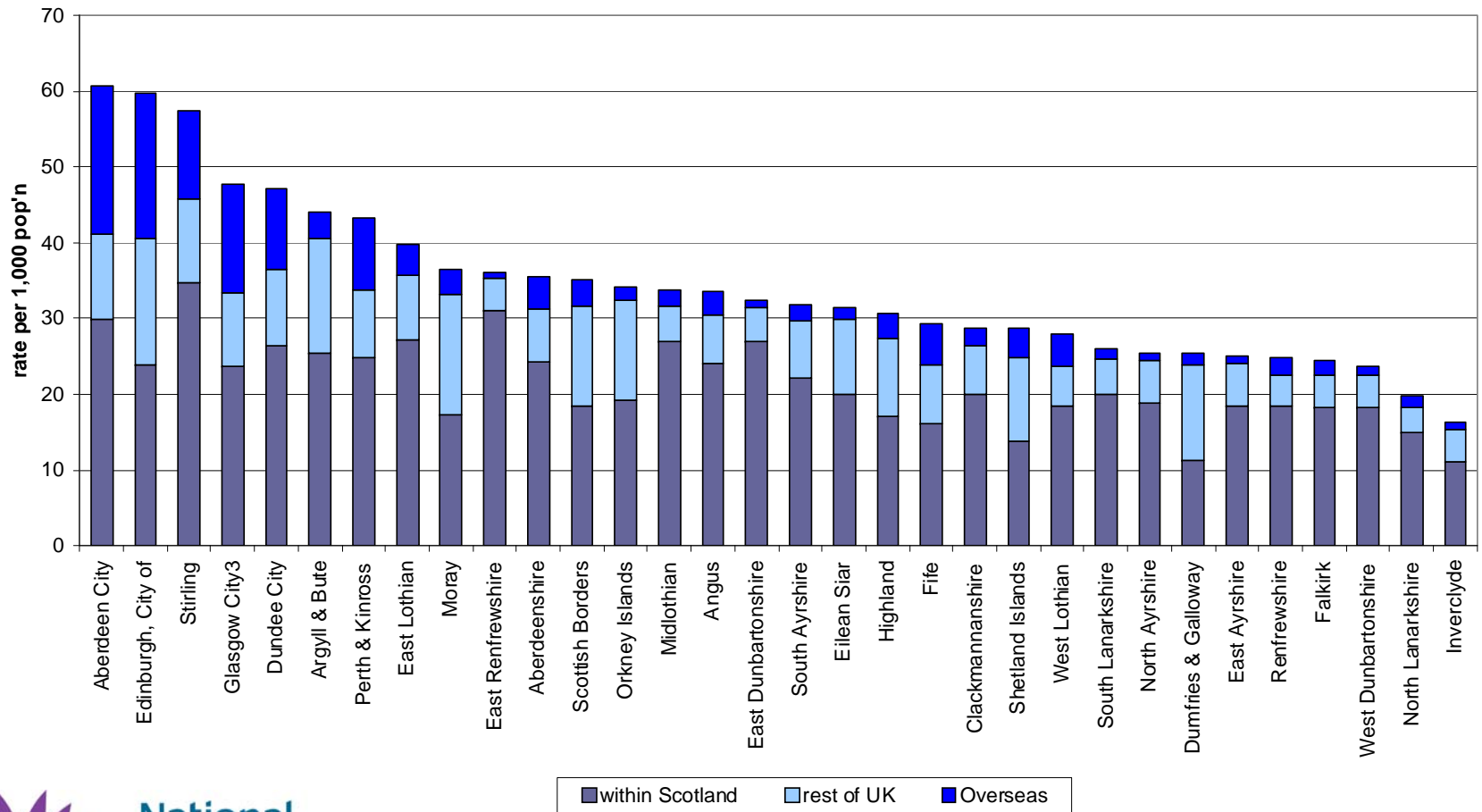


Population change Scotland by Council Area, 2011 to 2012

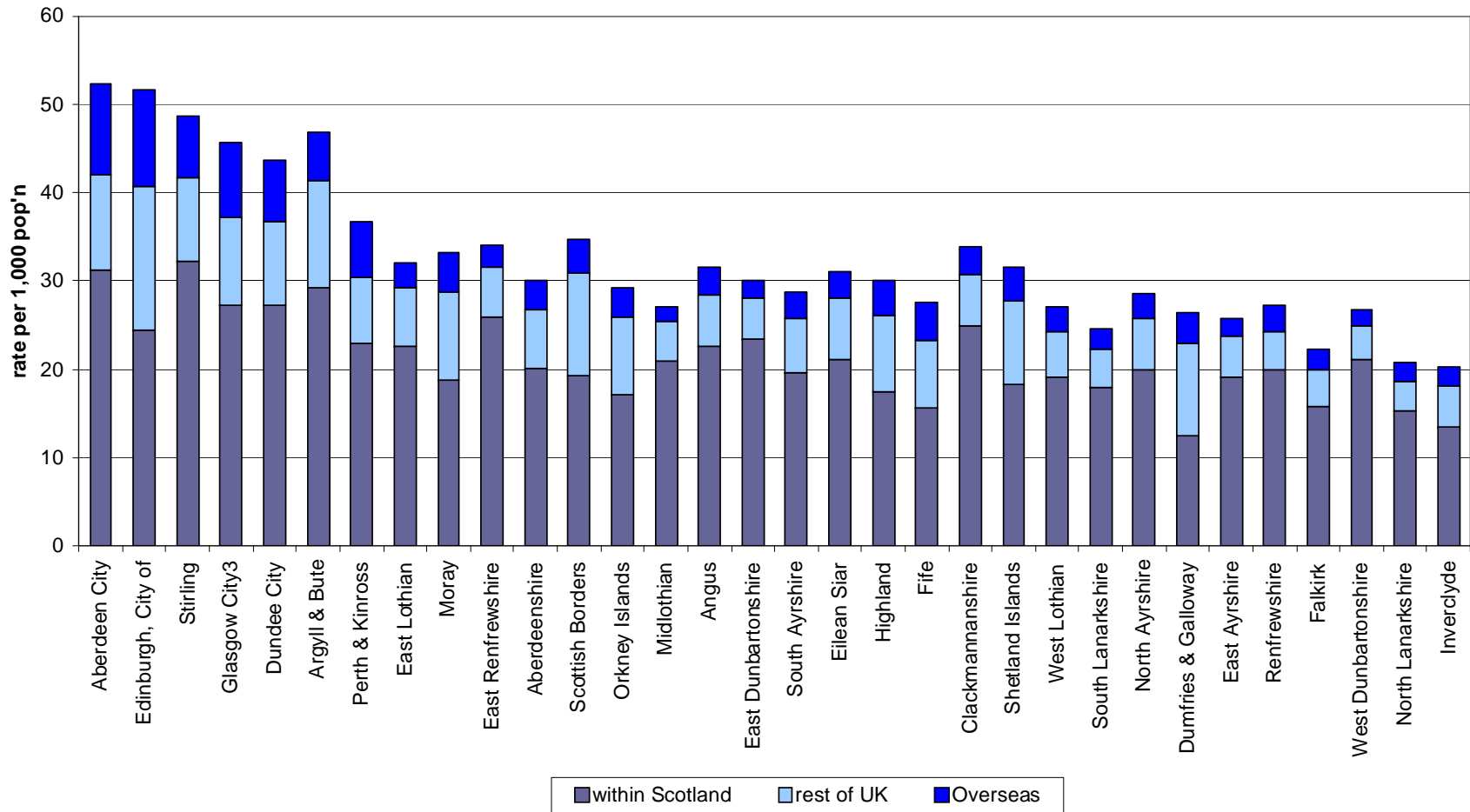
Percentage change



Council areas: in-migrants as rate per 1,000 of population



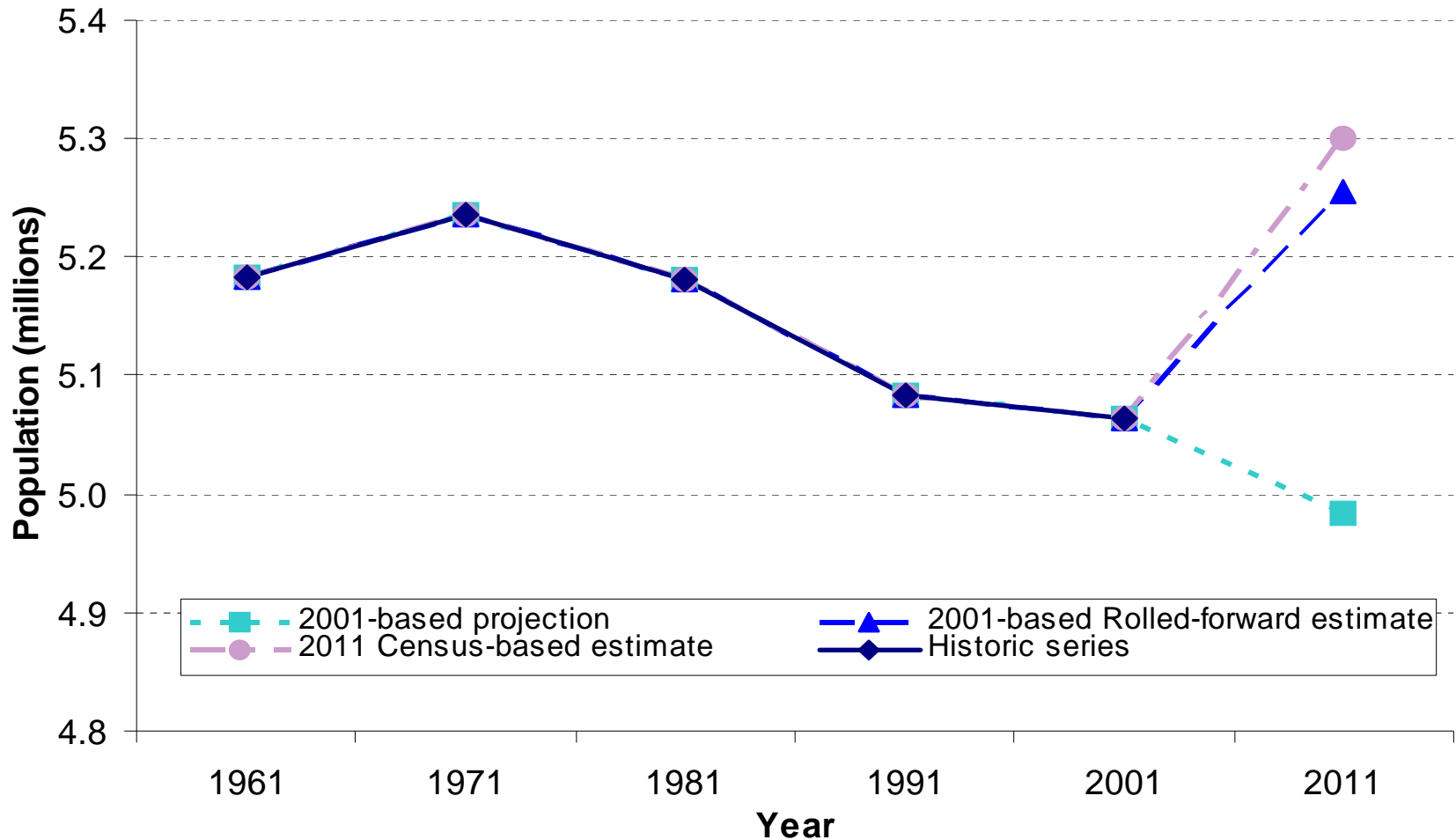
Council areas: out-migrants as rate per 1,000 of population



Reconciling the Census with rolled-forward estimates

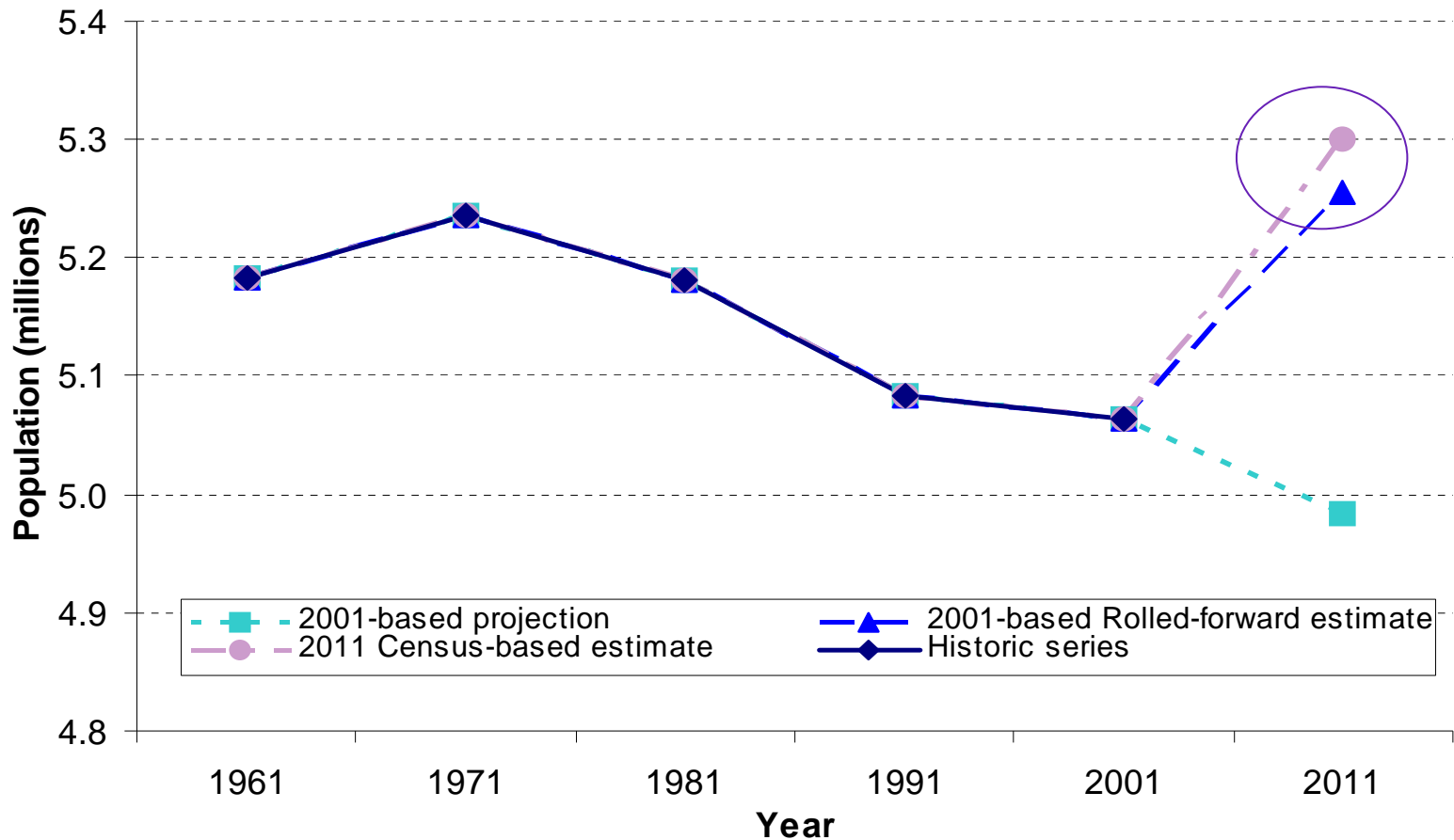
A lot can happen in ten years....

Population of Scotland, mid-years 1961 to 2001, and variants for 2011



How did we do?

Population of Scotland, mid-years 1961 to 2001, and variants for 2011

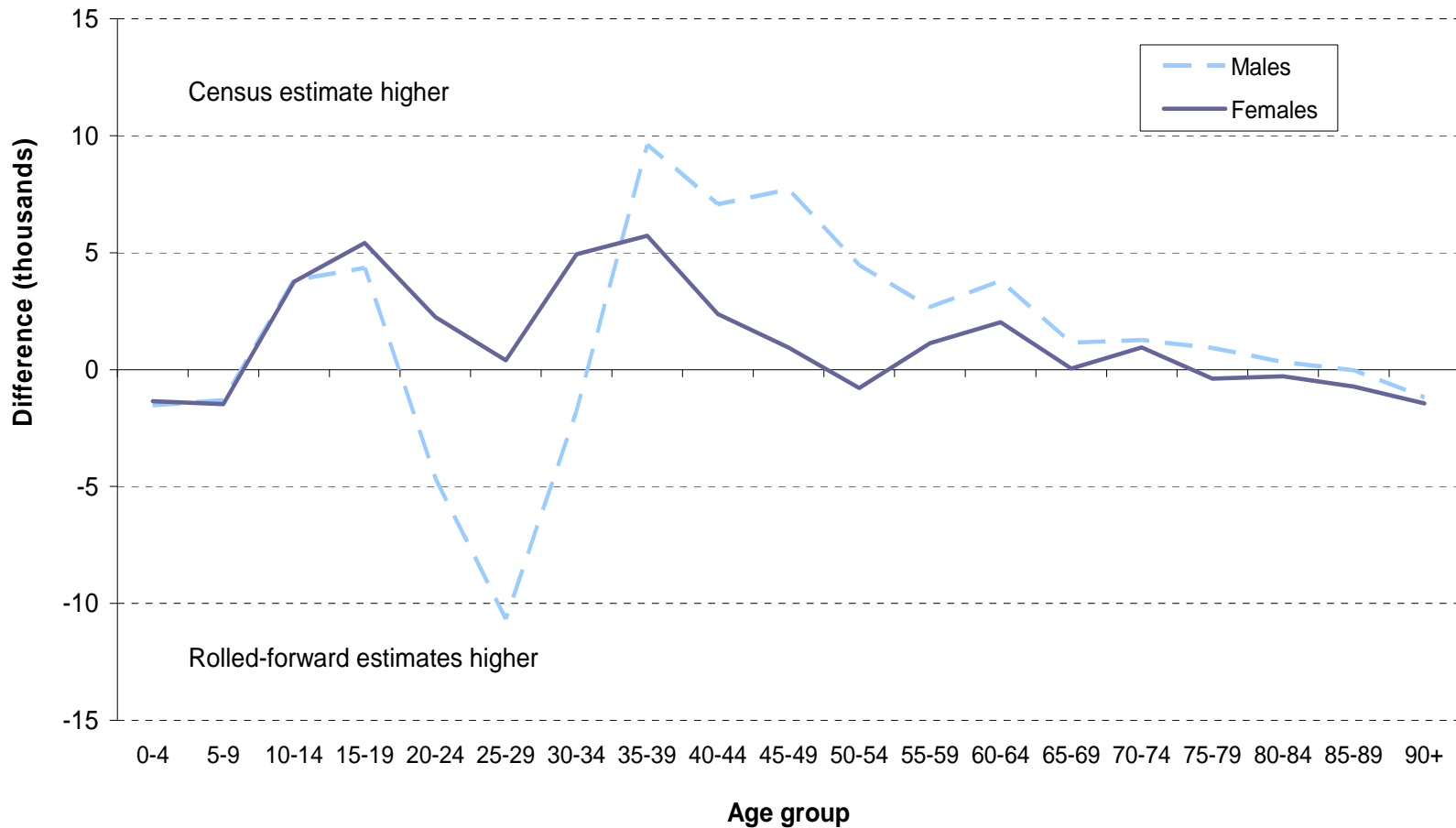


Difference at Scotland Level

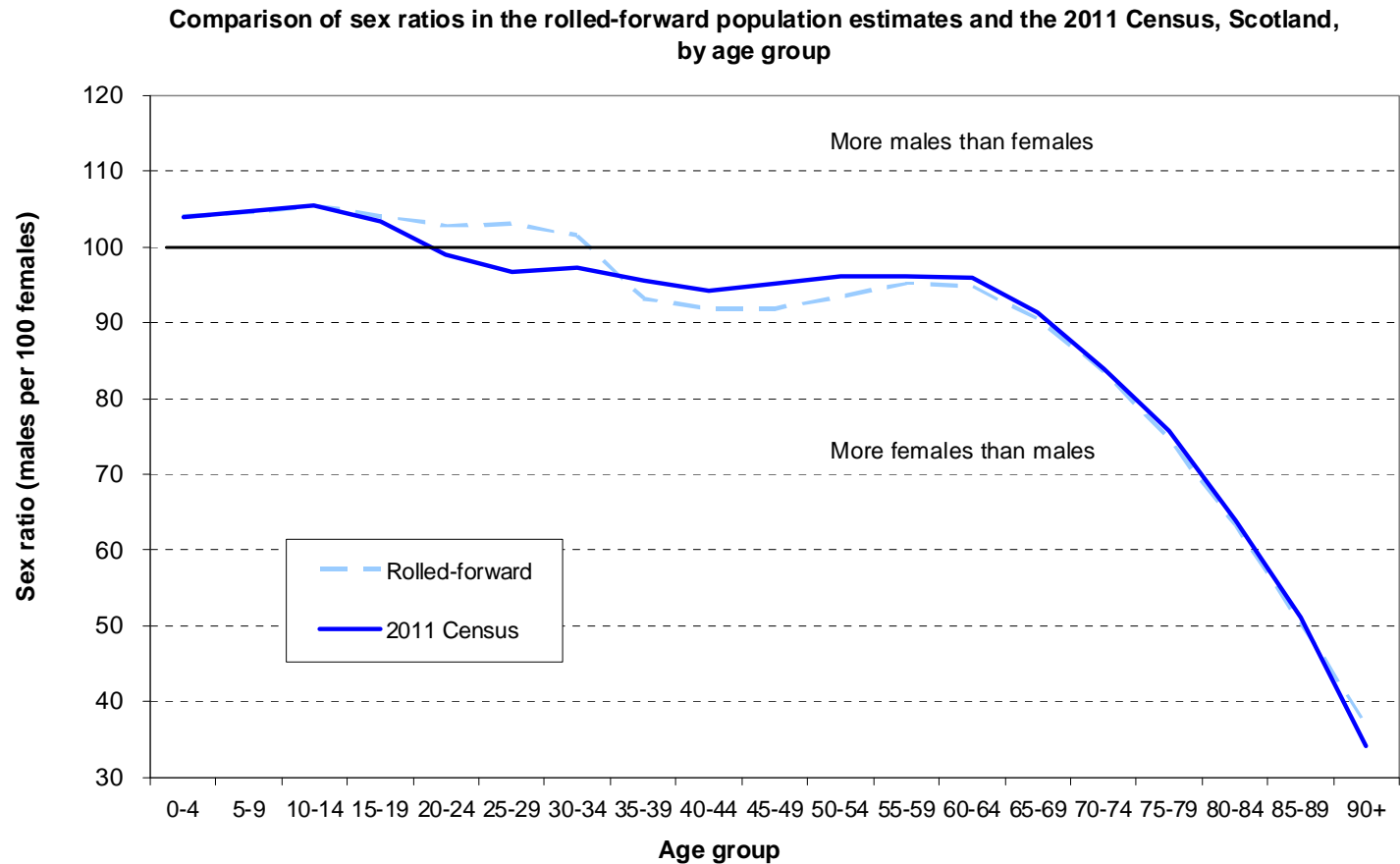
The 2011 Census estimated the population of Scotland to be 5,295,400, which was **49,400 higher** than the 5,246,000 given by the rolled-forward estimates based on the previous census – **0.9% of the population.**

Thousands				
Scotland	Rolled-forward Estimates a	2011 Census Estimates b	Difference to explain = b - a	Difference as % of Census estimate = ((b - a) / b) * 100
Persons	5,246	5,295	49	0.9
Males	2,541	2,567	26	1.0
Females	2,705	2,728	23	0.9

Differences by age and sex



Differences by age and sex



Reasons for the Difference

- We expect to find a difference as there are many components involved in estimating population change.
- Rebasing the mid-year estimates with the latest census results is a key part of the methodology. The 2011 and 2012 estimates reflect this – 2002 to 2010 estimates will be rebased in October/November.
- The difference at national level due to incomplete accounting for births, deaths, migration, recording of armed forces personnel, definitional differences and imprecision in the two censuses themselves.
- Difficult to reconcile all these potential sources with each other but they help give reasons why there is a difference.

Reasons for the difference

- 1) Error in the 2001 and 2011 Census bases
(particularly within confidence intervals)
2001: +/- 0.33% or +/- 16,700
2011: +/- 0.44% or +/- 23,000
= up to 39,700
- 2) Components of the rolling-forward process
(particularly migration)
= up to 40,000 + 4,400 + ? + ?
- 3) Definitional differences
= up to a few thousand

The rolling forward process

previous population estimate

- prisoners
- armed forces

age on by one year

+ births

- deaths

+/- net migration

+ prisoners

+ armed forces

new population estimate

The rolling forward process

previous population estimate

- prisoners
- armed forces

age on by one year

+ births

- deaths

+ / - net migration

+ prisoners

+ armed forces

new population estimate

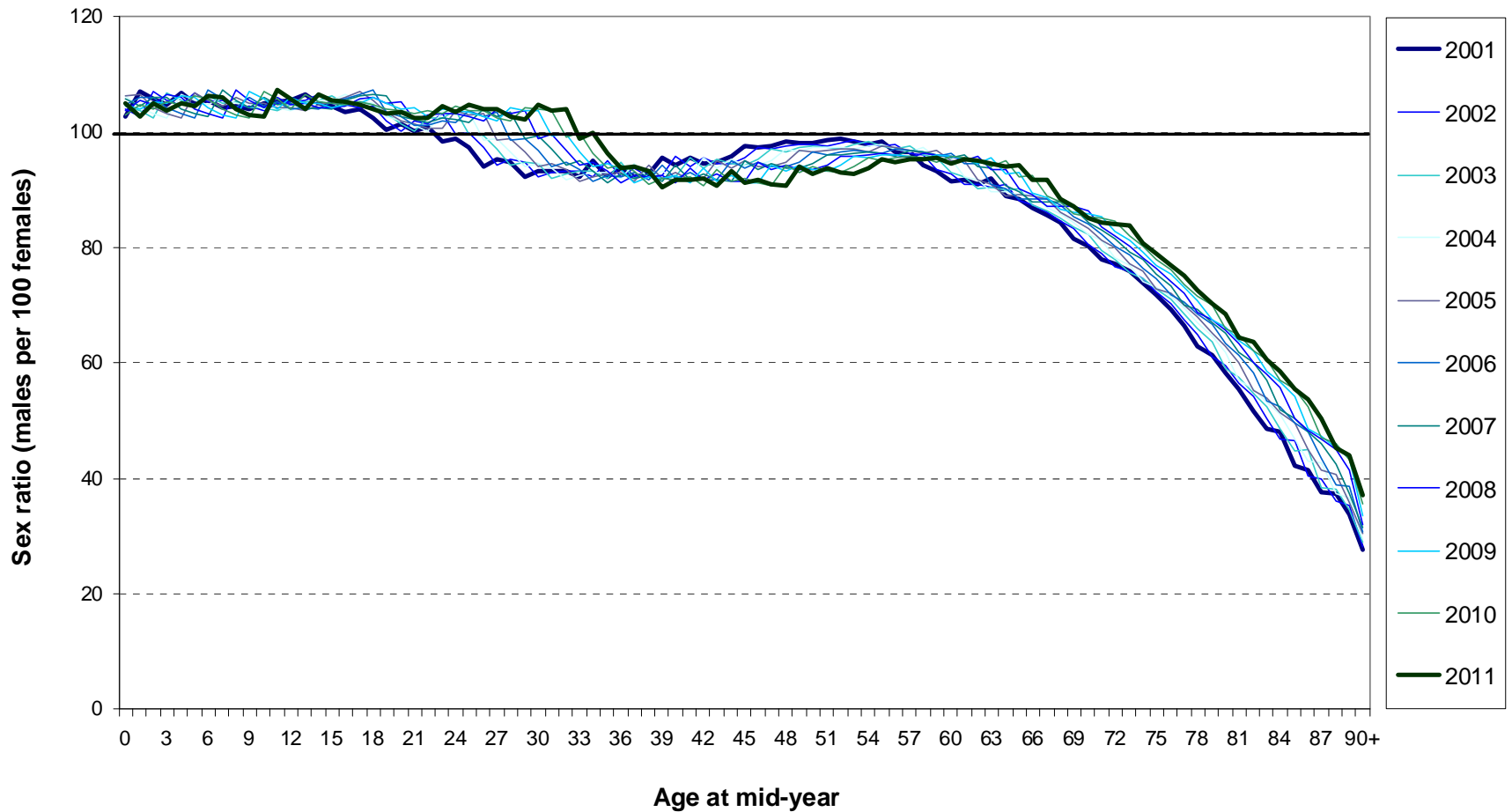
The complicated part



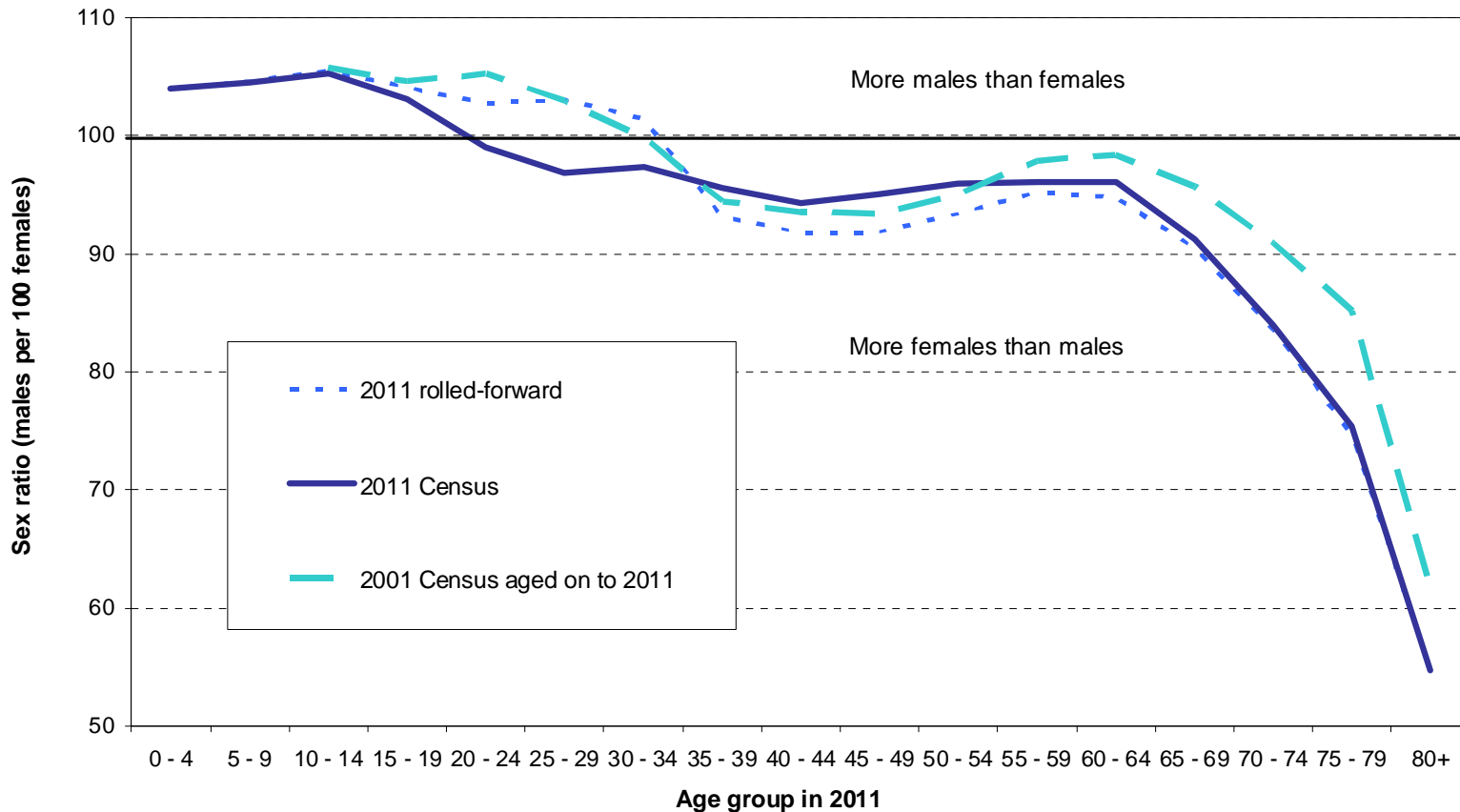
Confidence intervals around censuses

- 95 per cent confidence intervals for the total Scottish population in the censuses :
- 2001: +/- 0.33% or +/- 16,700
- 2011: +/- 0.44% or +/- 23,000
- This means that, we are confident that the true population of Scotland lay between 5.05 and 5.08 million people in 2001 and between 5.27 and 5.32 million people in 2011.
- A difference as large as 39,700 could be explained due to the levels of confidence around the censuses.

Sex ratios in the 2001-based series



Sex ratios in the 2001-based series



Note: Ages are estimated as at census day 2011. No data is available from the 2001 Census for those aged 0 to 9 in 2011 as children in this group have been born since the last census.

Components of Migration

At national level differences due to:

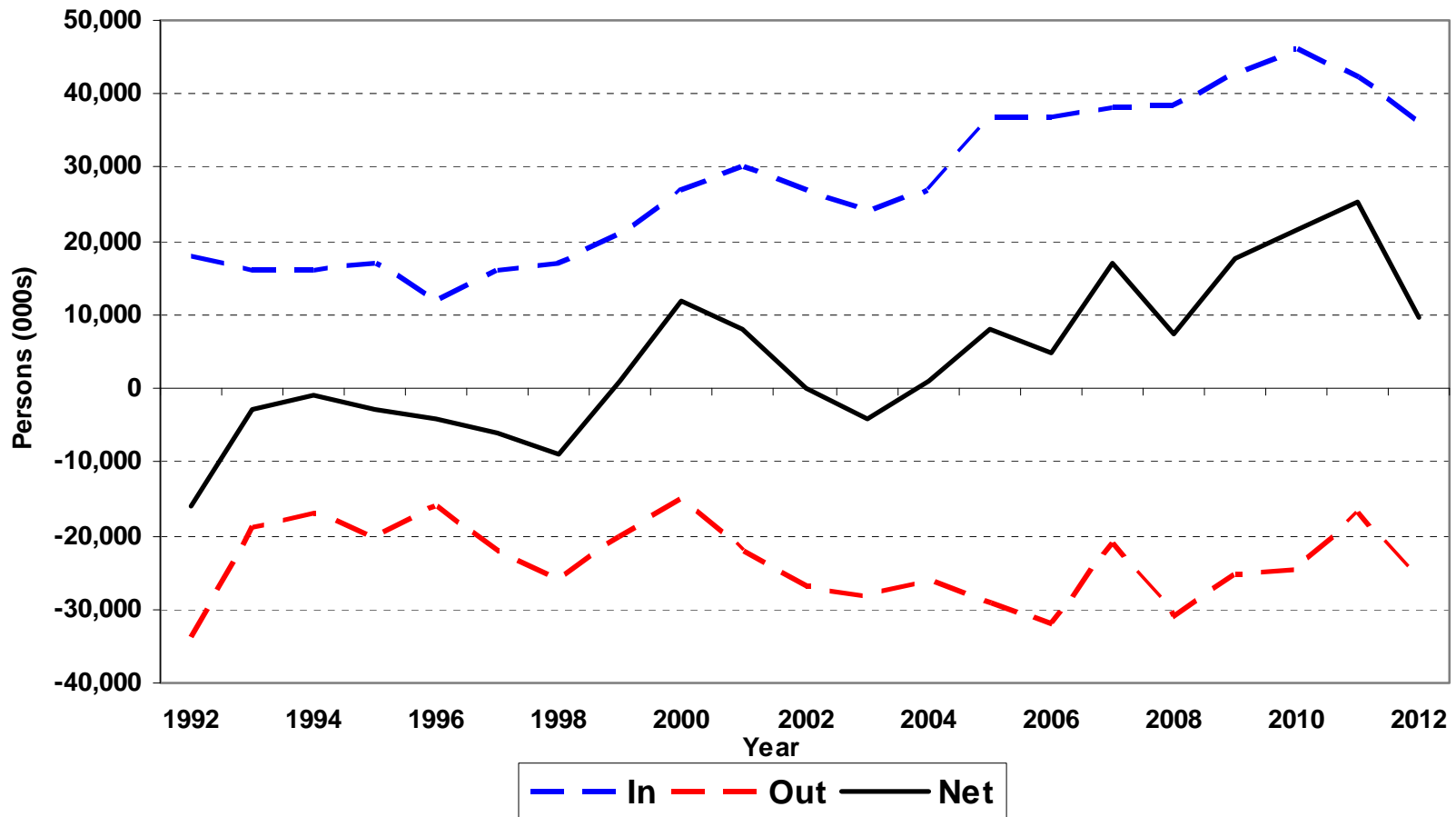
- **International migration** (based on LTIM/IPS)
- **Cross-border migration** (based on NHS Central Register (NHSCR) Central Health Index (CHI))

At subnational level differences also due to:

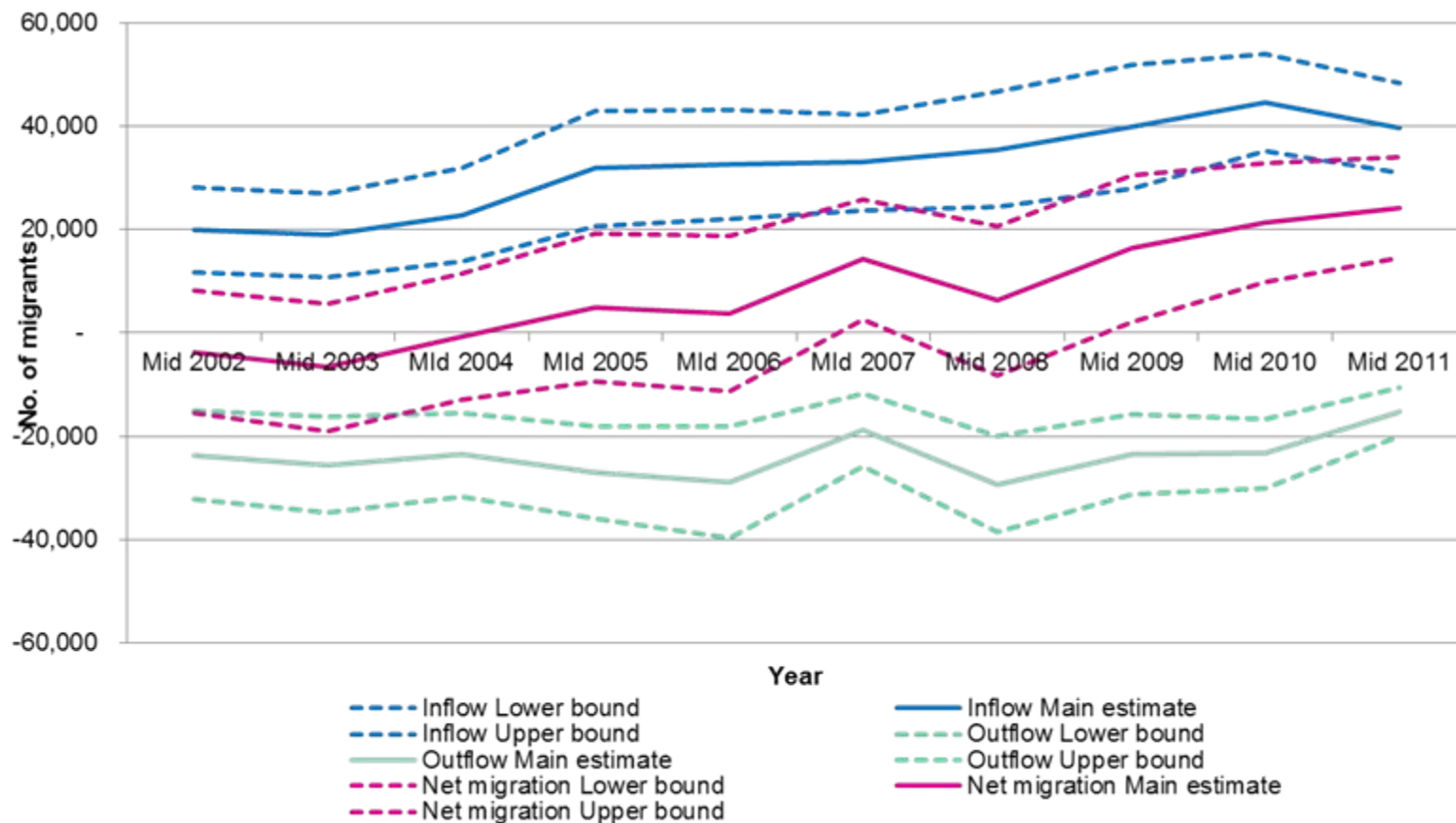
- Distribution of international and cross-border migrants
- **Internal migration** within Scotland (based on NHSCR / CHI)

International migration

International migration - between Scotland and overseas (101,600)



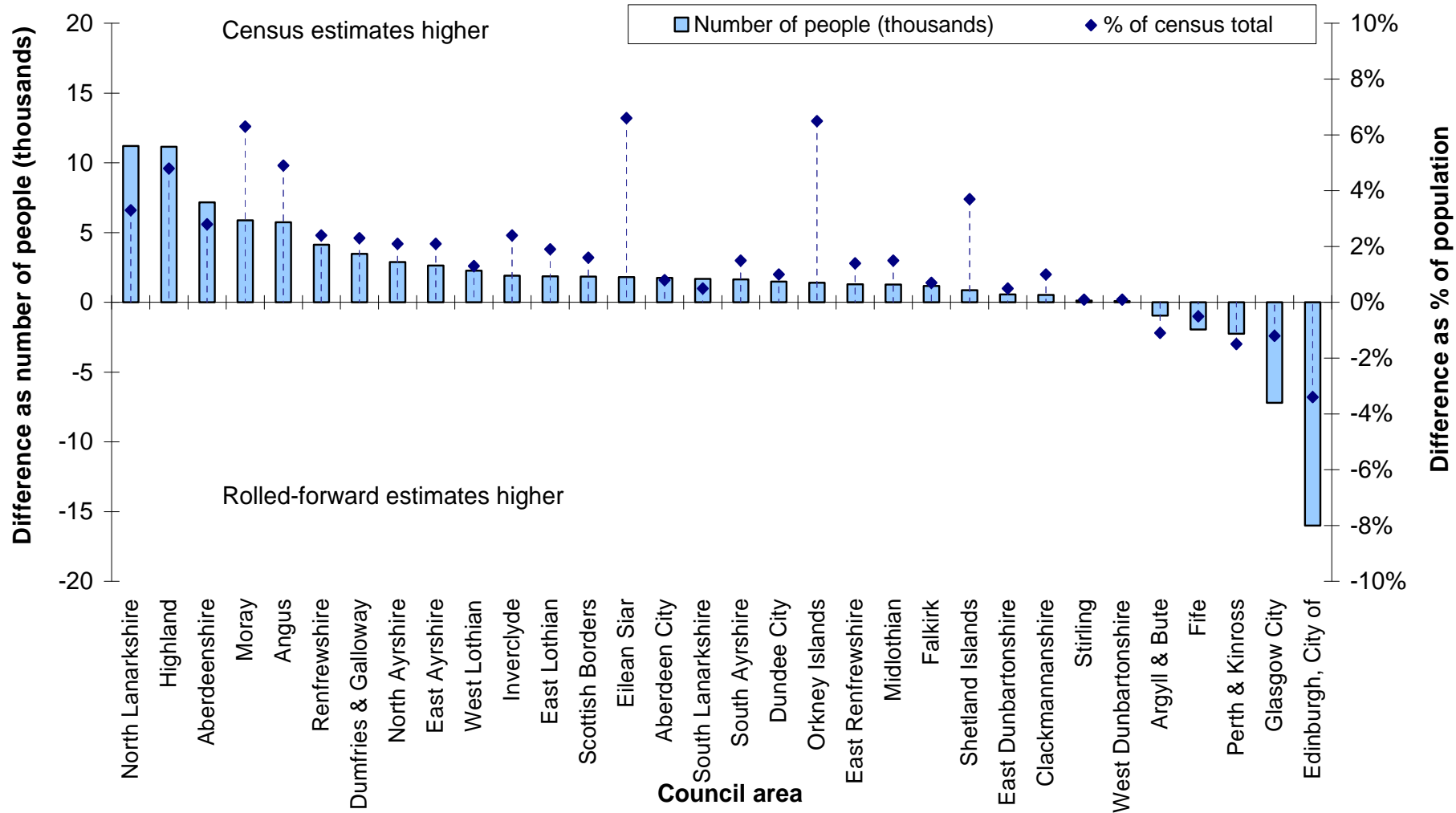
Confidence intervals around International Passenger Survey (IPS) estimates for Scotland, mid-2001 to mid-2011



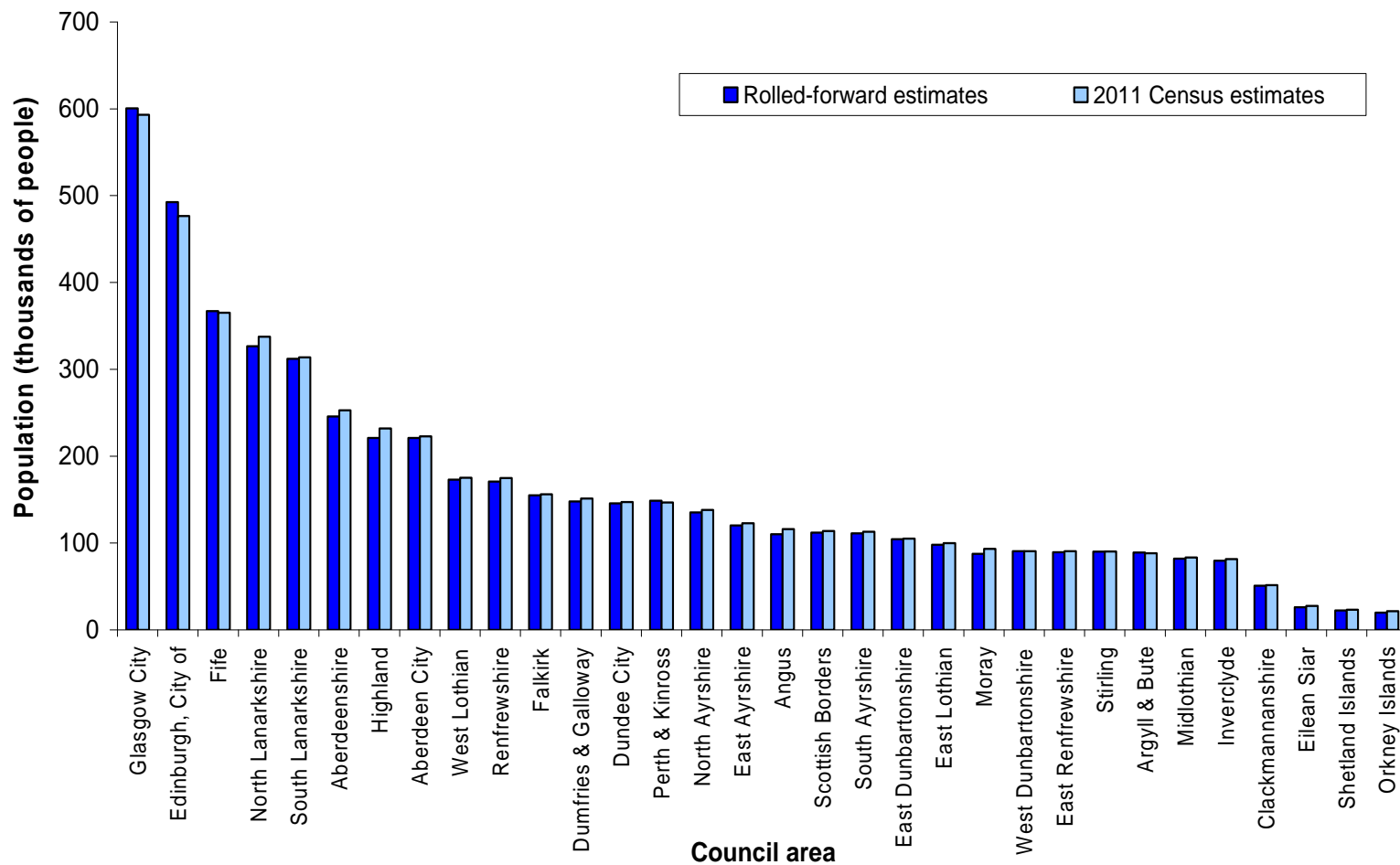
Confidence in overseas migration estimates

- Net inward migration of 80,000 used
(mid-2001 to mid-2011)
- BUT 95% confidence interval of **39,000 to 120,000** (more people entering than leaving) over the ten years.
- Due to small sample for Scotland – improvements have been made
- Changes to methodology over ten years – would have estimated more migrants using current method
- Potential error in other components

Differences in Council Areas

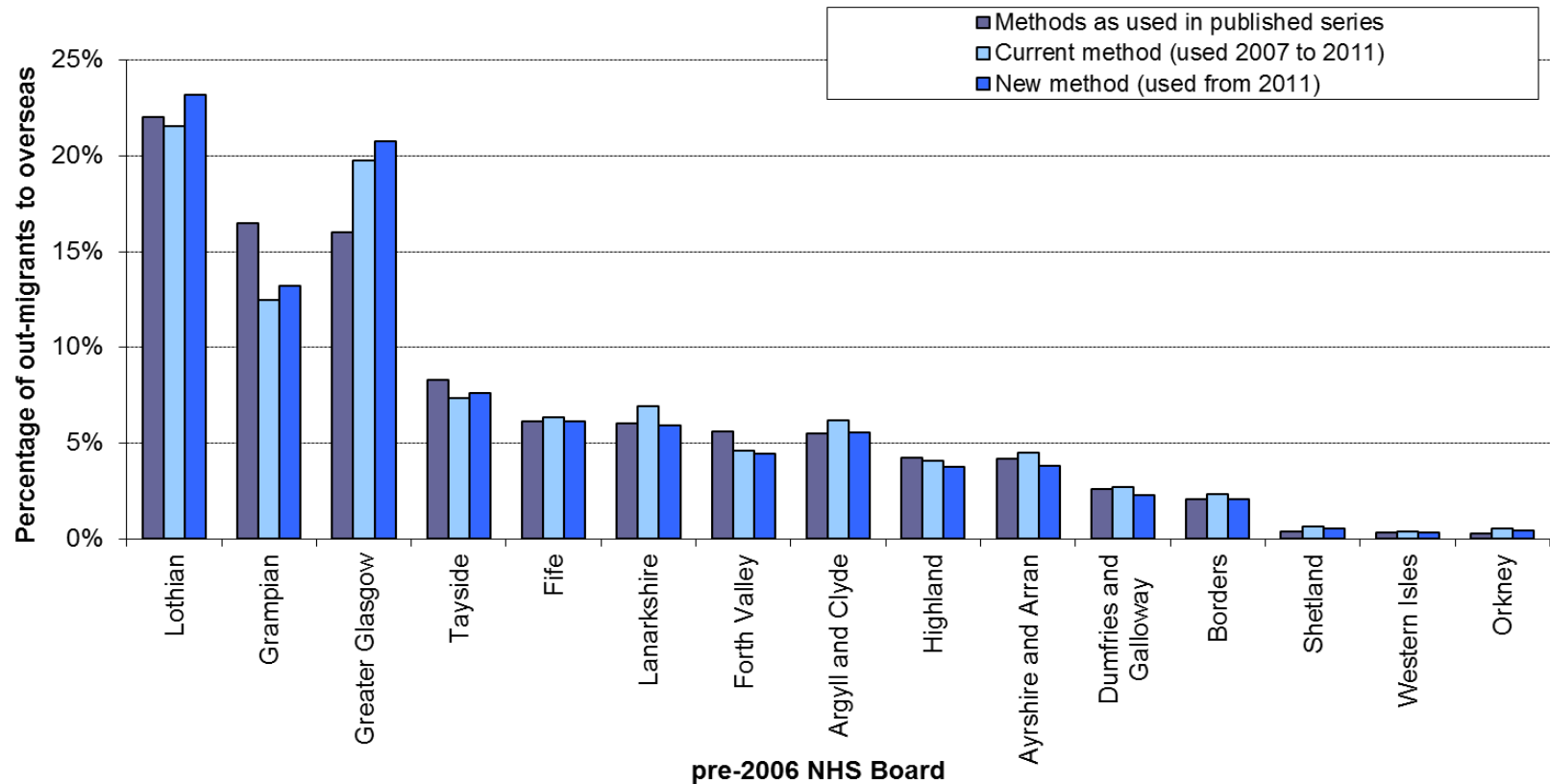


Estimates for Council Areas



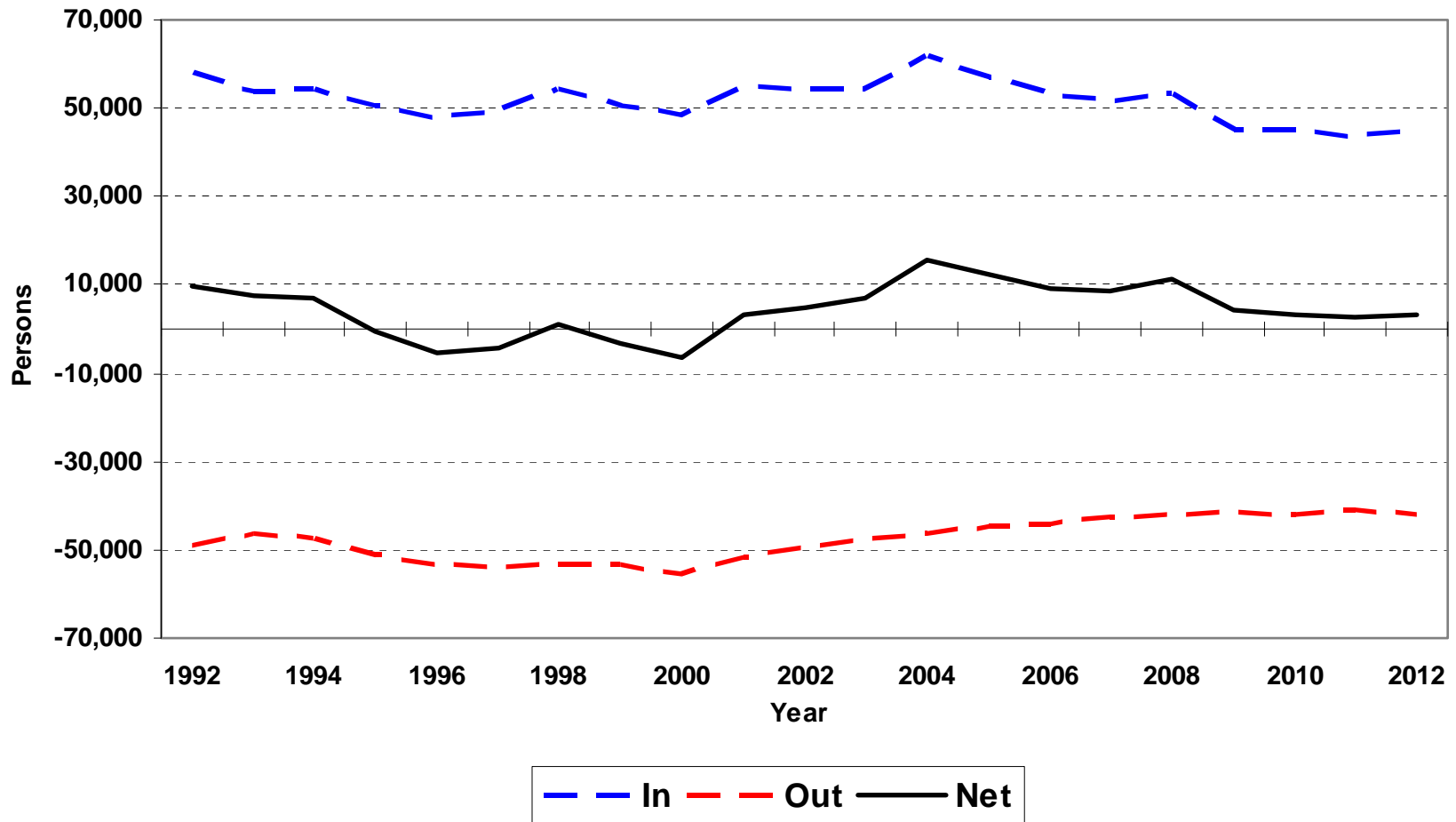
Distribution of overseas migrants -

Out-migration to overseas from each NHS Board area, 2001 to 2011



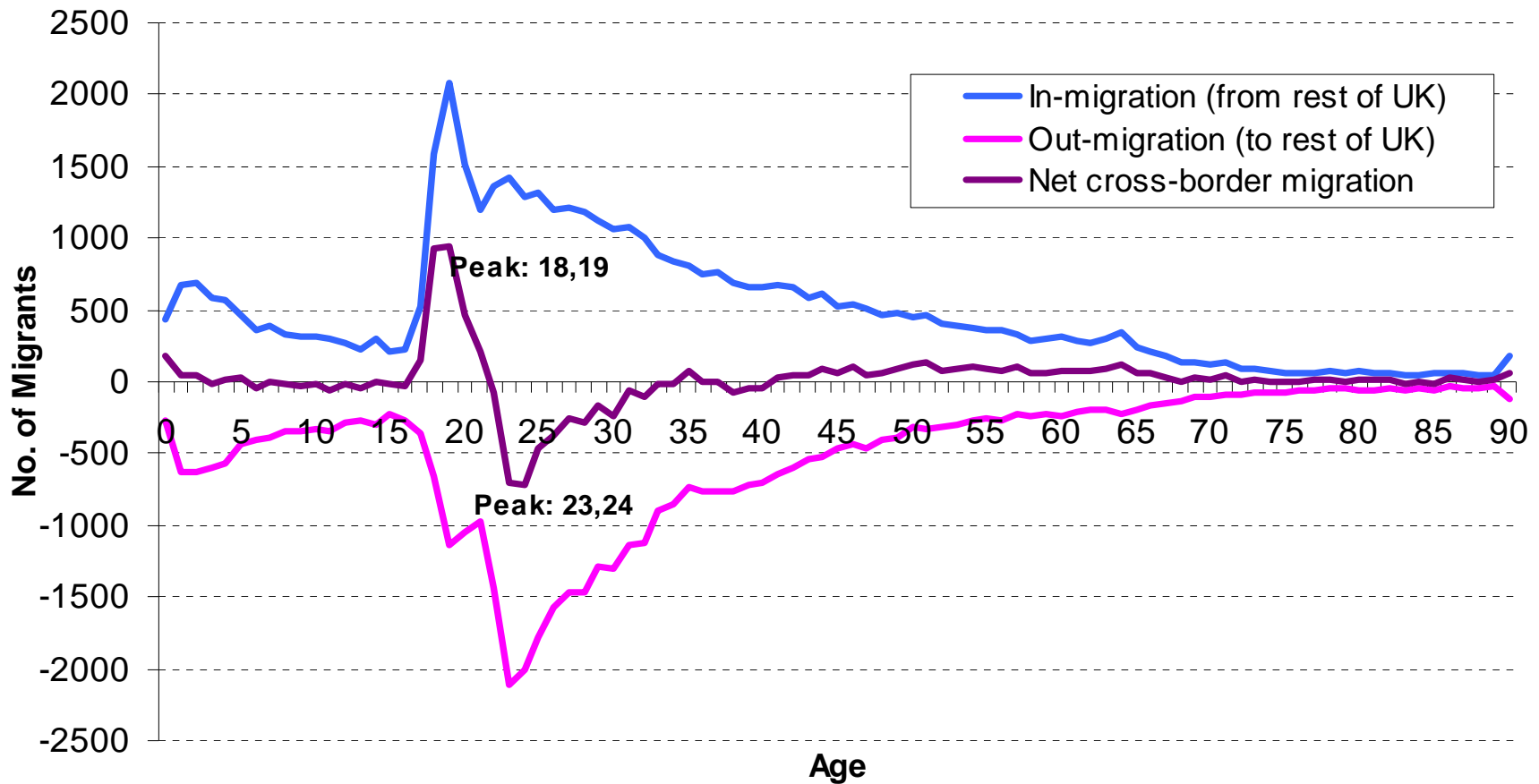
Cross-border migration

Cross-border migration - between Scotland and the rest of the UK (81,400)

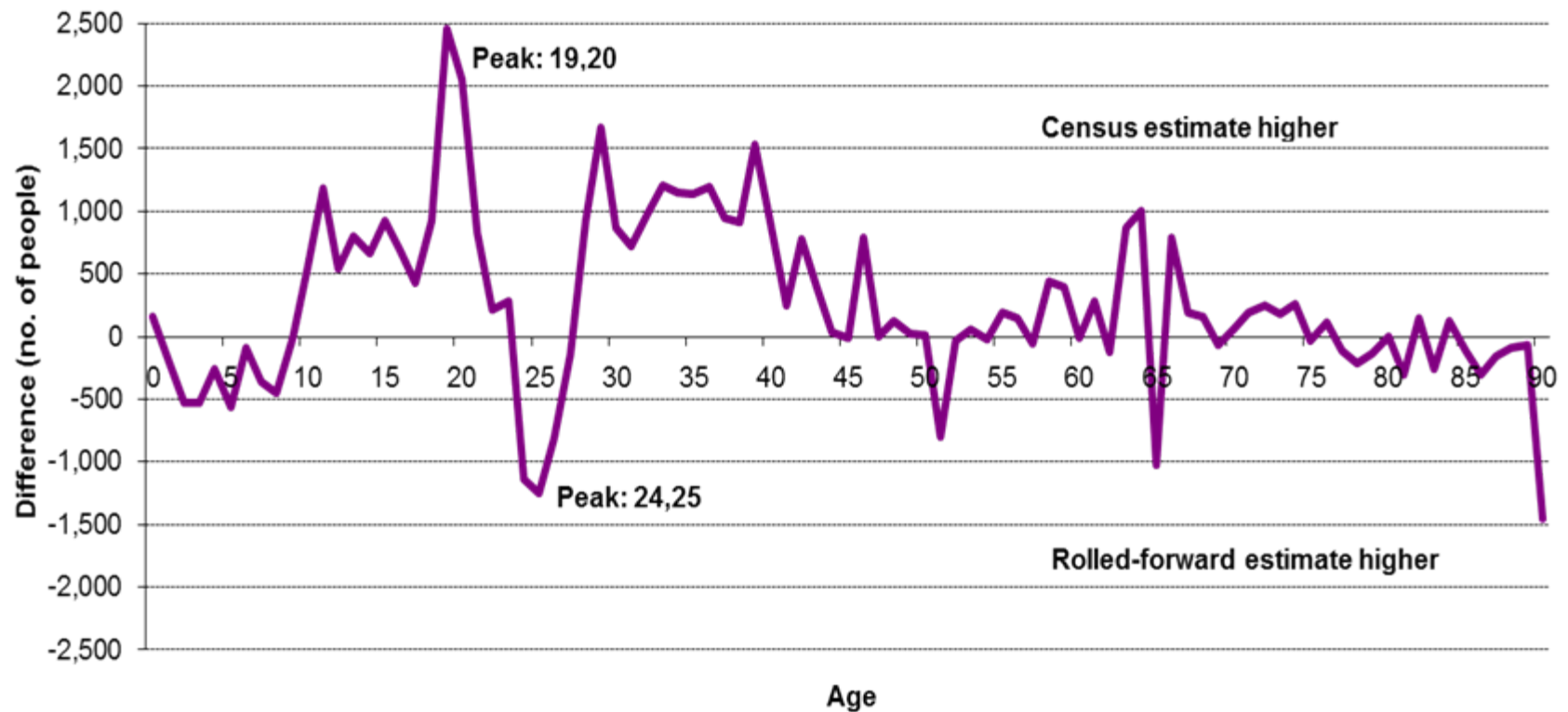


Cross-border migration flows by age

(2010 to 2011)

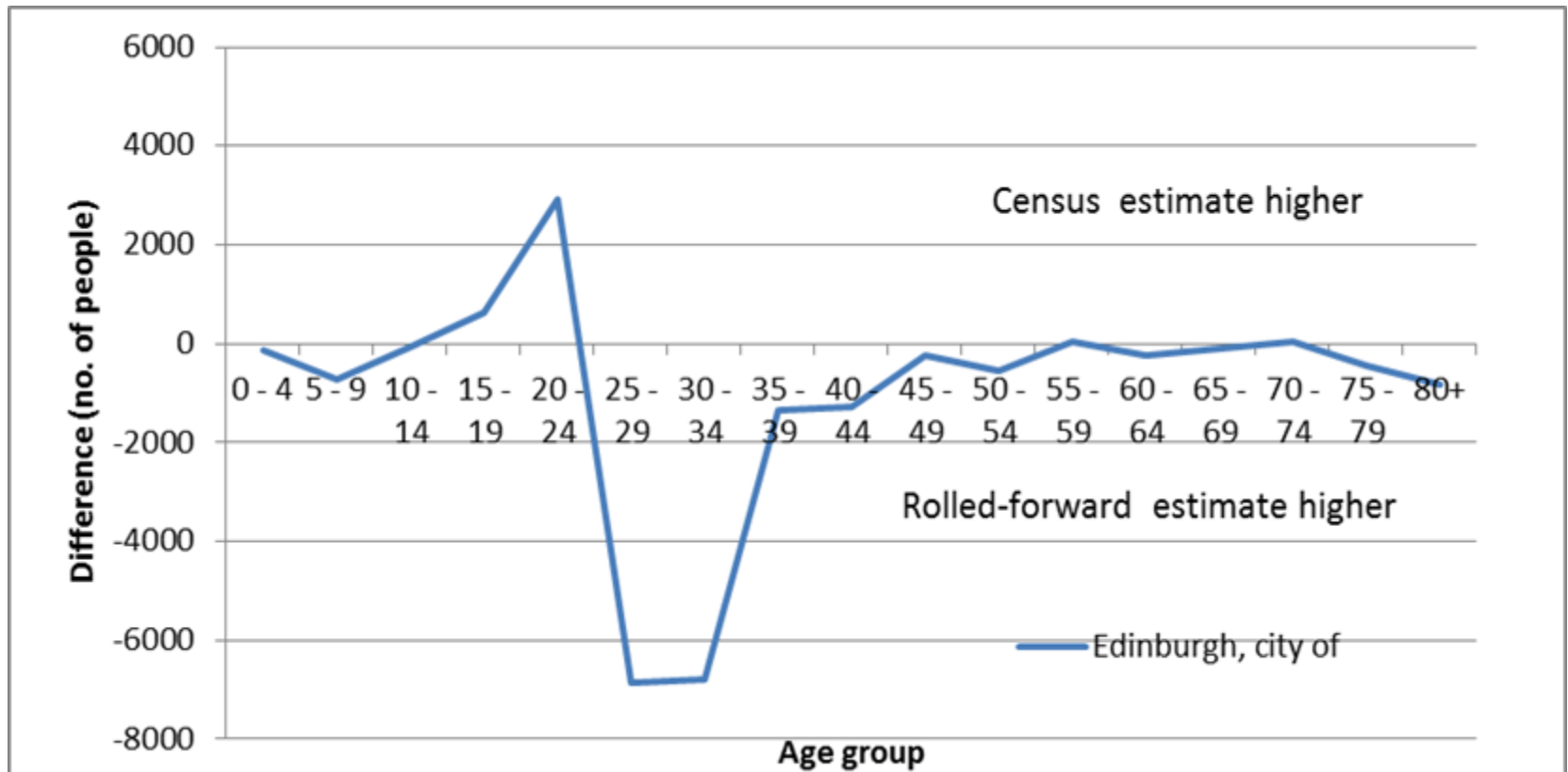


Difference between Census and rolled-forward estimates – females, single year of age

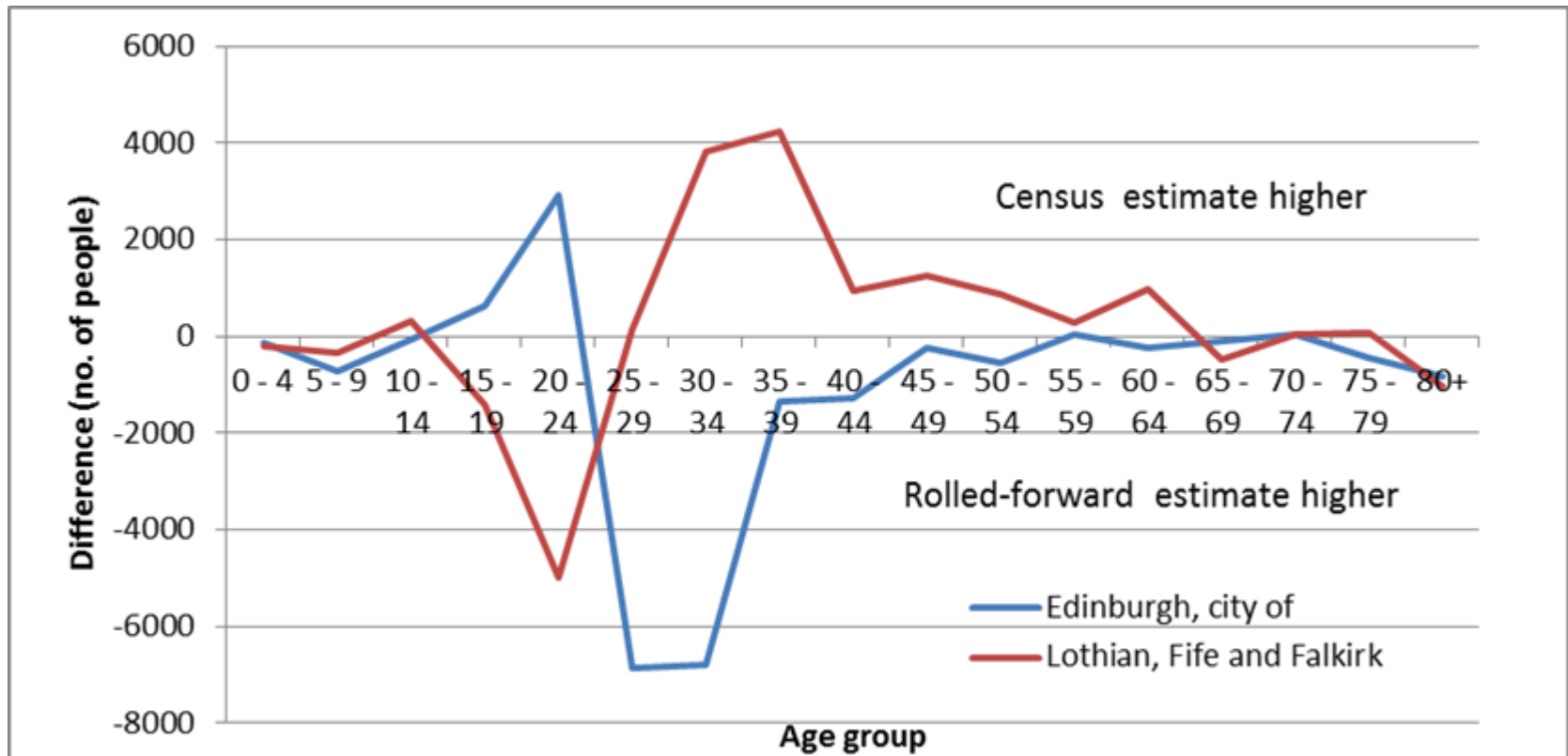


Internal, within Scotland migration

Internal & Cross-border Migration – Comparison of differences by age in Edinburgh and surrounding areas



Internal & Cross-border Migration – Comparison of differences by age in Edinburgh and surrounding areas



Other Reasons for differences

- Births and deaths well accounted for
- Cross-border migration from the rest of the UK (measured through NHS Central Register & Community Health Index)
- Armed forces & Prisoners
- Other groups e.g. students

What does this mean for our estimates?

- We expect to find a difference as there are many components involved in estimating population change.
- Rebasing the mid-year estimates with the latest census results is a key part of the methodology.
- The 2011 and 2012 estimates published in August reflect this – 2002 to 2010 estimates will be rebased on 17 December 2013 to give a consistent time series taking into account the new information from the 2011 Census.
- We have now reviewed and improved some aspects of our methodology, particularly around international migration distributions.

Further work

- Work to improve population estimates is continuing, including investigating other sources such as:
 - Higher Education Statistics Agency (HESA) data
 - Council Tax data
- Further work will use 2011 Census data on previous address and country of birth to evaluate our migration data and assumptions.
- The Scottish Longitudinal Study will use data linkage to compare the Censuses and administrative sources.
- The Beyond 2011 Programme is also exploring the future provision of population statistics in Scotland. As part of this Programme NRS are investigating a range of solutions, to produce population statistics in future.

For further information please view the following publications in the Population Estimates section of the National Records of Scotland website:-

[‘Mid-2011 and Mid-2012 Population Estimates’](#)

[‘2011 Census Reconciliation Report – Population’](#)

For more information please contact:
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